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July 16, 2007
PY-CEI/NRR-3047L

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Perry Nuclear Power Plant
Docket No. 50-440

Ladies and Gentlemen:

Enclosed is Licensee Event Report (LER) 2007-001, "Automatic Reactor Protection System Actuation Due To Reactor Coolant Level Decrease."

There are no regulatory commitments contained in this letter or its enclosure. Any actions discussed in this document that represent intended or planned actions are described for the NRC's information, and not regulatory commitments.

If there are any questions concerning this matter, please contact Mr. Jeffrey J. Lausberg, Manager – Regulatory Compliance, at (440) 280-5940.

Very truly yours,

Barry S. Allen

Barry S. Allen

Enclosure: LER 2007-001

cc: NRC Project Manager
NRC Resident Inspector
NRC Region III

IE22

NRR

NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB NO. 3150-0104 EXPIRES 6/30/2007
LICENSEE EVENT REPORT (LER) (See reverse for required number of digits/characters for each block)	Estimated burden per response to comply with this mandatory collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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4. TITLE
Automatic Reactor Protection System Actuation Due To Reactor Coolant Level Decrease

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
05	15	2007	2007	- 001 -	000	07	16	2007	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE: 1

10. POWER LEVEL: 31

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(a)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER Specify in Abstract below or in NRC Form 366A
☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Thomas J. Stec, Regulatory Compliance	(440) 280-5163

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete EXPECTED SUBMISSION DATE).* ☒ NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On May 15, 2007, at approximately 0058 hours, the Reactor Protection System (RPS) automatically actuated in response to decreasing reactor pressure vessel (RPV) coolant level. At the time of the event, Reactor Feedwater System test/tuning activities were in progress with the reactor operating at approximately 31 percent of rated thermal power. All control rods fully inserted into the core and RPV coolant level was restored with no actuation of emergency core cooling systems.

The cause of the event was attributed to a decrease in RPV coolant level resulting from a design logic error not detected during modification pre-operational review or test activities. A contributing cause included a weak conduct of testing process.

The design logic error was corrected. The testing instruction was revised. Existing procedures are being revised, and enhanced procedural guidance will be implemented to improve temporary instruction control, conduct of testing, implementation of engineering changes, and infrequently performed tests and evolutions.

This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A) as an event that resulted in automatic actuation of the RPS.

17. **NARRATIVE** *(If more space is required, use additional copies of NRC Form 366A)*

Energy Industry Identification System Codes are identified in the text as [XX].

INTRODUCTION

On May 15, 2007, at approximately 0058 hours, the Reactor Protection System (RPS) [JC] automatically actuated in response to decreasing reactor pressure vessel (RPV) coolant level. At the time of the event, the plant was in Mode 1 (i.e., Power Operation) with the reactor operating at approximately 31 percent of rated thermal power (RTP). At 0153 hours, notification was made to the NRC Operations Center (ENS Number 43363), in accordance with 10 CFR 50.72(b)(2)(iv)(B), for an event or condition that resulted in actuation of the RPS when the reactor was critical. This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A) as an event or condition that resulted in automatic actuation of the RPS.

EVENT DESCRIPTION

During the Perry Nuclear Power Plant's eleventh refueling outage in April, 2007, the electronic governor [65] system for the Reactor Feed Pump Turbine (RFPT) [TRB] Control System [SJ] was replaced with a new Digital Reactor Feed Pump Turbine Speed Control System (DRFPTSCS). As part of the startup activities from the refueling outage, Reactor Feedwater System test/tuning was being performed in accordance with test instruction (TXI)-0373, "Digital Feedwater Control Systems Startup Test and Tuning."

On May 15, 2007, the test/tuning activities were in progress with reactor power at approximately 31 percent of RTP and RPV coolant level in the normal level band at approximately 196 inches above top of active fuel (TAF). All Emergency Core Cooling Systems (ECCS), Emergency Diesel Generators, and the Reactor Core Isolation Cooling (RCIC) System were operable. As the activities progressed, with RFPT "A" feeding the RPV and RFPT "B" at idle speed (i.e., not feeding the RPV), a logic design error manifested itself resulting in a decrease in RPV coolant level. Upon reaching RPV Level 4, approximately 192 inches above TAF, the Level 4 annunciator came in and alerted the Reactor Operator (RO) and Senior Reactor Operator (SRO). As RPV coolant level decreased to 190 inches above TAF, the SRO directed the RO to place the Digital Feedwater Control System (DFWCS) in "manual." The RO placed the RFPT "A" in manual control, using the manual/auto station on the DFWCS Operator workstation display, as RPV coolant level decreased to approximately 185 inches above TAF. Although manual action was taken to recover the RPV coolant level, the decreasing level could not be recovered before RPV coolant level reached the RPV Level 3 RPS setpoint (i.e., 178 inches above TAF).

At approximately 0058 hours, the RPS automatic actuation occurred as a result of the low RPV coolant level signal and all control rods fully inserted into the core. The turbine/generator tripped, per plant design, and the residual heat from the reactor was removed through the condenser. The reactor mode switch was placed in the "Shutdown" position in accordance with plant procedures, and the plant entered Mode 3 (i.e., Hot Shutdown). Operators started the Motor Driven Feedwater Pump to restore RPV coolant level and the level was stabilized in accordance with plant procedures. The ECCS and RCIC Systems were neither required nor used to respond to the event. At 0130 hours, the RPS actuation signal was reset. At 1842 hours, the Residual Heat Removal Pump "A" was started in the shutdown cooling mode, and at approximately 2053 hours, the plant entered Mode 4 (i.e., Cold Shutdown)

17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

CAUSE OF EVENT

The cause of the automatic RPS actuation is attributed to the decrease in the RPV coolant level associated with Reactor Feedwater System testing/tuning activities. The RPV coolant level decrease was caused by a design logic error within the design modification to the DRFPTSCS. The design logic error did not allow the feedwater control system to respond correctly in order to automatically maintain the proper RPV level. The design logic error was not identified prior to testing the system on line due to a weakness in the owner acceptance review process.

Contributing to the cause of the RPS actuation was an insufficient test control process that resulted in weak implementation of test activities. Procedural guidance was not established to specifically address the "conduct of testing" activities. The TXI had a limited scope and limited formality for entering into and exiting from the TXI itself. Critical aspects were missing from the infrequently performed tests and evolutions (IPTE) process. When the RPV level began to decrease, the off normal instruction (ONI), "Feedwater Flow Malfunction," should have been followed instead of placing the RFPT in manual control using the manual/auto station on the DFWCS Operator workstation display.

EVENT ANALYSIS

Based upon the following information, this event is considered to be of very low safety significance. This event, including the plant response, is bounded by evaluation in the plant's Updated Safety Analysis Report. There was no risk significant equipment out of service at the time of the event. The core damage and large early release probabilities (CDP and LERP) computed for this event are not considered to be significant risk. The scram is represented by a class of events that have a moderate frequency (i.e., once per year to once every 20 years). The probabilities of core damage and large early release associated with the reactor scram are not significant contributors to the Perry baseline Core Damage Frequency of 4.017E-06 per year or the baseline LERP of 1.5E-07 per year.

CORRECTIVE ACTIONS

The design logic error was corrected through implementing a design change to each RFPT logic. Test Instruction TXI-0373, was revised to include additional testing. Testing and tuning of the DFWCS was field completed.

A review of this event and its causes were provided to the licensed operators. Hands-On simulator training was provided on this event to reinforce how use of the "Feedwater Flow Malfunction" ONI would have facilitated maintaining control of RPV level.

Business Practice NOBP-OP-0007, "IPTE" will be revised to establish the scope of review for the review of the IPTE checklist. This action is currently scheduled for completion in October, 2007.

Peer group acceptance will be sought for a change to NOP-CC-2003, "Engineering Changes," to identify criteria for development and documentation of the Verification/Review Plan currently identified in the procedure for outsourcing design changes. This action is currently scheduled for completion by end of August, 2007. A separate corrective action will be generated to identify the course of action agreed upon by the peer group and any related procedure changes.

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17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

Procedure PAP-1107, "Temporary Instruction Control," will be changed to include clear TXI entry and exit, suspension, and termination criteria. It will define the expected organizational response for unexpected test results or unexpected transients during a TXI. The procedure will require a brief at the start of each shift or procedure section. This action is currently scheduled for completion in October, 2007.

A "Conduct of Test" procedure will be created based upon, and aligned with, best industry practices in order to increase the formality and quality of testing. Testing criteria will include clear roles and responsibilities of each test participant, termination criteria, and expected responses to unexpected results. Lessons learned from this event will be communicated to site supervision. These actions are currently scheduled for completion in October, 2007.

FENOC Project Management will review FENOC processes/procedures to ensure that any FENOC projects for digital controls have the correct standards and durations established for testing. This action is currently scheduled for completion in October, 2007.

PREVIOUS SIMILAR EVENTS

A review of Licensee Event Reports (LER) over the past 3 years did not identify any previous similar events. A review of corrective action documents over this time period concludes that no condition reports were found relevant to the failure mechanisms, which defined this event.

COMMITMENTS

There are no regulatory commitments contained in this report. Actions described in this document represent intended or planned actions, are described for the NRC's information, and are not regulatory commitments.

Note: Although this LER has been reviewed and approved by site management, the associated condition report's root cause evaluation is expected to receive an internal "collegial" review by the site's corrective action review board after the LER has been submitted to the NRC.